U.S. Department
of Transportation
**Federal Aviation
Administration**

800 Independence Ave., S.W.
Washington, D.C. 20591

JUN 3 1983

Mr. Ross DiGiacinto
President, Specialized
Electronics Corporation
9629 Irving Park Road
Schiller Park, Illinois 60176

Dear Mr. DiGiacinto:

This is in response to your May 11 letter regarding the acceptability of the Navtronic Navigator and Explorer flight computers for use in taking Federal Aviation Administration (FAA) written tests.

We have examined the Navtronic Navigator and Explorer flight computers and find that it complies with all the guidelines set forth in FAA Advisory Circular 60-11. All information displayed on the unit examined, including the prompt symbols, appears to be pertinent to the actual operation of the device and, therefore, need not be masked and is acceptable for use during either airmen written or practical examinations.

The use of any material containing instructions related to operation of the calculator, as is the case for all aids, is not permitted during the test. Each regional Flight Standards division will be notified of this decision through receipt of a copy of this letter.

We trust this information sufficiently responds to your concerns.

Sincerely,

Bernard A. Geier

Bernard A. Geier
Manager, General Aviation &
Commercial Division, AFO-800

REPAIRS

For repairs after the Warranty has expired fill out the card on the reverse side of this page, tear it off and send it to SPECIALIZED ELECTRONIC CORPORATION with your computer and a check or money order for $18.00 to cover handling and shipping charges.

You will be advised if additional charges are necessary.

Be sure to include all accessories with your computer and send it prepaid to:

SPECIALIZED ELECTRONICS CORPORATION
9629 IRVING PARK ROAD
SCHILLER PARK, ILLINOIS 60176

DO NOT RETURN TO YOUR DEALER.

NAVTRONIC

WARRANTY REGISTRATION

NAME ______________________________

ADDRESS ______________________________

CITY ____________________ STATE __________ ZIP __________

COUNTRY ______________________________

DATE OF PURCHASE ______________________________

WHERE PURCHASED ______________________________

EXPLORER ________ NAVIGATOR ________

OCCUPATION ________

PILOT RATINGS ________

BASE AIRPORT ________

APPROX. NO. OF HOURS ________

THIS CARD MUST BE FILLED OUT AND MAILED TO VALIDATE WARRANTY

REPAIR ORDER

NAME ______________________________

ADDRESS ______________________________

CITY ______________________ STATE ____________ ZIP ____________

COUNTRY ______________________ TELEPHONE NO. ______________________

DESCRIBE MALFUNCTION ______________________________

____

____

PLACE
STAMP
HERE

Specialized Electronics Corporation
9629 Irving Park Rd.
Schiller Park, IL 60176

NAVTRONIC

"THE COMPUTER THAT TALKS BACK"

SPECIALIZED ELECTRONICS CORPORATION
9629 Irving Park Road, Schillier Park, IL 60176

1/1/83
U.S. PATENTS 3979057, 3979058 Foreign patents

THE ART OF NAVIGATION

Navtronic Flight Computers

Flight Computer Operation Manual

TABLE OF CONTENTS

UNIT TESTS

Display Test

CONV

Turn unit on. Press the [↕] key, than the [C/ce] key. Press [OFF] key. Partial display will be shown. **Do not clear the program.**

For the second display test, push the [9] key. This will show the second half of the display. Press the [9] key again to show entire display. Press the [9] key once more, 0 will appear on the display.

Key Closure Test

Press [ON] key once to turn the unit on. Press [ON] key twice on tone alarm. Press [ON] key again to turn alarm off.

FEATURES

LIQUID CRYSTAL DISPLAY—
Visable in a wide range of light conditions from bright daylight to night lighting; uses very little power.

ALGEBRAIC ENTRY—
Allows entry of numbers and arithmetic functions in the same sequence as the problem develops.

FLOATING DECIMAL (Arithmetic Operation)—
Decimal point is automatically positioned to display six-digit accuracy.

AUTO CONSTANT—
Permits repetitive addition, subtraction, multiplication, and division operations without re-entering constant or function. The first number entered is the constant.

RUGGED CONSTRUCTION—
High-impact plastic case and solid state CMOS integrated circuitry.

OPERATING TIME—
CMOS circuits draw extremely low power, ensuring extended operation from the same batteries.

POWER SUPPLY—
Four N-cell alkaline batteries.

KEY FUNCTIONS

DATA KEYS

ON [ ] Press key to turn unit on.

OFF [ ] Press key to turn unit off.

[1]–[0] Display the number indicated on the key.

[•/:] Press once to display decimal point. This key is also used to display TIME data in hours, minutes, and seconds. (See Timer Operation.)

[+/–] Press to change the sign of the number displayed to allow processing with logically positive or negative sign.

ARITHMETIC KEYS

[=] Press to finish an arithmetic calculation. Displays the answer.

[+] Adds the number in the display to the next number entered.

[–] Subtracts the next number entered from the number in the display.

[X] Multiplies the number in the display by the next number entered.

[÷] Divides the number in the display by the next number entered.

CONVERSION KEY

CONV [↕] Data in the display will be converted to other units. Press CONV then press the key corresponding to the units desired. The new display will be in terms of the new units. Examples are converting from statute miles to nautical miles and from degrees centigrade to degrees farenheit.

[↕] SHIFT — SHIFT enables the programs with the color/coded legends to be accessed. When the Navtronic is in timer mode, shift will enable the color coded legend timer functions to be performed.

CLEAR

[C/ce] Press once to clear the display. Press twice to clear all the data registers in the computer.

ENTER KEY

[ENTER] Press ENTER after keying in prompted data. Flight programs will begin their computation.

SPECIAL SYMBOLS DISPLAYED

C	Indicates overflow condition—restart the problem.
E	Indicates an error in data entry format.
*	Press [ENTER] to display second part of answer.
↕	Indicates CONV or SHIFT was the last key pressed.
CT	Compressability
⊙CG	Target CG
△ ALT	Delta altitude

ARITHMETIC OPERATIONS EXAMPLES

FLOATING DECIMAL POINT DISPLAY:

[1] [2] [•/:] [3] [4] [5] [6] [X] — 12.3456

[1] [0] [0] [0] [÷] — 12345.6

[1] [0] [0] [=] — 123.456

CLEAR ENTRY:
123.456 x 110 = 13580.245

[1] [2] [3] [•/:] [4] [5] [6] [X] — 123.456

[1] [1] [1] [C/ce] — 0

[1] [1] [0] [=] — 13580.1

OVERFLOW:

[9] [8] [7] [6] [5] [4] [X] — 987654.

[2] [1] [0] [=] — C

[C/ce] — 0

CHANGE SIGN:
123 x (–.45) = –55.35

[1] [2] [3] [X] [•/:] [4] [5] [+/–] [=] — - 55.35

ADDITION:
1234 + 9876 = 11110

[1] [2] [3] [4] [+] [9] [8] [7] [6] [=] — 11110.

SUBTRACTION:
123.4 - 56.78 = 66.62

[1] [2] [3] [•/:] [4] [–] — 123.4

[5] [6] [•/:] [7] [8] [=] — 66.62

MULTIPLICATION:
(–.543) x 21 = –11.403

[•/:] [5] [4] [3] [+/–] [X] [2] [1] [=] — - 11.403

DIVISION:
23 ÷ 45.678 = .5035246

[2] [3] [÷] — 23

[4] [5] [•/:] [6] [7] [8] [=] — 0.50352

SQUARE:
$14^2 = 196$
$2.73^2 = 7.4529$

[1] [4] [X] [=] — 196

[2] [•/:] [7] [3] [X] [=] — 7.4529

POWER OF NUMBER:

$21^3 = 9261$

$.49^5 = .0282475$

[2] [1] [X] [=] [=] — 926 1

[.] [4] [9] [X] [=] [=] [=] [=] — 0.02824

RECIPROCAL:

x = 37

1/x = .027027

[1] [÷] [3] [7] [=] — 0.02 702

CHAIN OPERATION:

$\frac{((2 \times 3) + 8)^2 - 5}{-7} = -33$

[2] [X] [3] [+] [8] [X] [=] — 196.

[÷] [7] [+/-] [−] [5] [=] — - 33.

AUTOMATIC CONSTANT:

1.79 + 38 + 1.79 = 41.58

1.79 + 2.94 = 4.73

1:79 + 4.73 = 6.52

[1] [.] [7] [9] [+] [3] [8] [=] [=] — 41.58

[2] [.] [9] [4] [=] — 4.73

[4] [.] [7] [3] [=] — 6.52

3.74 − 2.96 = .78

3.74 − 1.89 = 1.85

[3] [.] [7] [4] [−] [2] [.] [9] [6] [=] — 0.78

[1] [.] [8] [9] [=] — 1.85

4.63 − 2.85 = 1.78

6.27 − 2.85 = 3.42

[2] [.] [8] [5] [+/-] [+] [4] [.] [6] [3] [=] — 1.78

[6] [.] [2] [7] [=] — 3.42

2.8 x 3.5 X 2.8 = 27.44

2.8 x 76 = 212.8

[2] [.] [8] [X] [3] [.] [5] [=] [=] — 27.44

[7] [6] [=] — 212.8

483 ÷ .19 = 2542.1052

483 ÷ 3 = 161

[4] [8] [3] [÷] [.] [1] [9] [=] — 2542.1

[3] [=] — 161.

621 ÷ 37 = 16.783783

2.9 ÷ 37 = .0783783

[1] [÷] [3] [7] [X] [6] [2] [1] [=] — 16.7837

[2] [.] [9] [=] — 0.07837

TIME ADDITION:
2 hrs. 34 min. 51 sec.
+ 48 min. 27 sec. = 3 hrs. 23 min. 18 sec.

[2] [°/:] [°/:] [3] [4] [°/:] [5] [1] 02:34:51

[+] [°/:] [°/:] [4] [8] [°/:] [2] [7] [=] 03:23:18

TIME SUBTRACTION:
12 hrs. 34 min. 56 sec.
– 5 hrs. 26 min. 47 sec. = 7 hrs. 8 min. 9 sec.

[1] [2] [°/:] [°/:] [3] [4] [°/:] [5] [6] 12:34:56

[–] [5] [°/:] [°/:] [2] [6] [°/:] [4] [7] [=] 07:08:09

TIME MULTIPLICATION:
7.4 x 6 hrs. 34 min. = 48 hrs. 35 min. 36 sec.

[7] [°/:] [4] [X] [6] [°/:] [°/:] [3] [4] [=] 48:35:36

TIME DIVISION:
57 hrs. 3 min. 9 sec. ÷ 8 = 7 hrs. 7 min. 54 sec.

[5] [7] [°/:] [°/:] [3] [°/:] [9] [÷] [8]
[°/:] [°/:] [=] 07:07:54

5 hrs. 24 sec. ÷ 23 min. 18 sec. = 12.8925

[5] [°/:] [°/:] [°/:] [2] [4] 05:00:24

[÷] [°/:] [°/:] [2] [3] [°/:] [1] [8] 00:23:18

[=] [+] [°/:] [=] 12.8927

NOTE: When solving time arithmetic problems the answer will be in the same *FORMAT* as the last number entered.

CONVERSIONS

TIME: 2 hrs. 8 min. 19 sec. = 2.13861 hrs.

[2] [°/:] [°/:] [8] [°/:] [1] [9] [+] [°/:] [=] 2.13861

3.47513 hrs. = 3 hrs. 28 min. 30 sec.

[3] [°/:] [4] [7] [5] [1] [3] 3.47513

[+] [°/:] [°/:] [=] 03:28:31

DISTANCE/SPEED: 768 Nautical = 883.822 Statute

[7] [6] [8] 768

CONV NT→ST

[↕] [–] 883.822

174 mph = 151.197 knots

[1] [7] [4] 174

CONV ST→NT

[↕] [+] 151.197

TEMPERATURE: 21°F = -6.11111°C

[2] [1] 21

CONV °F→°C

[↕] [X] - 6.11111

-7°C = 19.4°F

[7] [+/-] - 7

CONV °C→°F

[↕] [÷] 19.4

BASIC AVIATION PROGRAM OPERATING INSTRUCTIONS

STEP 1.

Press the key for the aviation program that corresponds with the flight problem you wish to solve. This will initiate the desired program within the computer and cause one of the data input prompts to flash.

STEP 2

Press the necessary data keys to input the desired data requested by the flashing prompt and show that data in the display.

STEP 3

Press the [ENTER] key when the displayed data is correct. This will enter the data displayed and cause the next data prompt to flash if additional data is required or cause the computer to use the data entered and solve the flight problem and display the answer. Repeat steps 2 and 3 until no further data is requested by the data prompts and the flight problem answer is displayed; the units of the displayed answer will be displayed solidly, not flashing.

NOTE: When the display shows all 8's, the computer is processing the problem. Wait for a data prompt or your answer to be displayed before doing anything further.

The four arithmetic function operators (+, –, X, and ÷) and the conversion functions may be used during any flight program while a data prompt is flashing, without

affecting the program in process. The information displayed at the conclusion of these intermediate calculations may be entered into the problem by pressing the [ENTER] key or may be cleared by pressing the c/ce key once before proceeding with the flight problem in process.

A flight program key different from that in process may be pressed while a data prompt is flashing requesting that data be entered. When the new flight program is completed, the computer will return to the previous program position for the completion of the original flight program solution.

AVIATION PROBLEM SOLUTION EXAMPLES

TRUE AIRSPEED

What is your True Airspeed:

Recovery Coefficient is *0.7*
Outside Air Temperature is *–15*°C
Calibrated Airspeed is *280* Knots
Pressure Altitude is *40,000* feet

KEYS	PROMPTS	ENTRIES	DISPLAY
TAS [ ]	C_T †	[.] [7]	0.7
[ENTER]	°C	[1] [5] [+/-]	-15
[ENTER]	CAL AIR SPEED	[2] [8] [0]	280

† The Flight Computer suggests using 0.8 as a typical C_T or the value you last calculated as C_T.

ENTER	PRES ALT	4 0 0 0 0	40000
ENTER	**TRU AIR SPEED**	=	540

Your True Airspeed is 540 Knots.

CALIBRATED AIRSPEED

What Calibrated Airspeed should you fly to maintain a True Airspeed of 140 Knots:

Pressure Altitude is *12340* Feet
True Air Temperature is *–4°C*

KEY	PROMPT	ENTRIES	DISPLAY
CAS			
☐	CT†	%: 7	0.7
ENTER	C	4 +/-	- 4
ENTER	TRU AIR SPEED††	1 4 0	140
ENTER	PRES ALT	1 2 3 4 0	12340
ENTER	**CAL AIR SPEED**	=	115

you should fly at **115 Knots** Calibrated Airspeed to maintain a True Air Speed of 140 Knots.

† The Flight Computer suggested 0.7 because you used it last in the calculation for True Airspeed.

†† The 540 calculated earlier is suggested as a TAS value. Enter 140 to write over it.

DENSITY ALTITUDE

What is the Density Altitude at Santa Fe, New Mexico when the Air Temperature is 86°F:

Pressure Altitude is *6344* feet.

KEY	PROMPTS	ENTRIES	DISPLAY
D ALT		CONV °F→°C	
☐	°C	8 6 ↕ X	30
ENTER	PRES ALT	6 3 4 4	6344
ENTER	**DENSITY ALT**	=	9426

The Density Altitude is **9426** feet.

TIME TO CLIMB

How long will it take to climb to altitude:

Cruise Altitude is *12500* feet
Airport Elevation is *6344* feet
Rate of Climb is *650* feet per minute

KEY	PROMPT	ENTRIES	DISPLAY
T*to*CLB			
☐	△ ALT	1 2 5 0 0 –	12500
		6 3 4 4 =	6156
ENTER	FT/MIN	6 5 0	650
ENTER	**TIME TO CLIMB**	=	00:09:28

It will take **9 minutes and 28 seconds** to climb to. 12500 feet from the elevation of the airport.

DISTANCE TO CLIMB

How long will your ground track be to climb *5000* feet if your climb rate is *375* feet per minute and your ground speed is *180* knots:

KEY	PROMPT	ENTRIES	DISPLAY
DtoCLB			
[ ]	△ ALT	[5] [0] [0] [0]	5000
ENTER	FT/MIN	[3] [7] [5]	375
ENTER	G. SPEED	[1] [8] [0]	180
ENTER	**DIST to CLIMB**	=	40.

Your ground track will be **40.** nautical miles when you reach 5000 feet.

RATE OF CLIMB

What must your Rate of Climb be to cross a fix *6.7* nm from your take off area at an altitude of *8800* feet MSL:

Ground Speed is *97* knots
Airport Elevation is *6344* feet

KEY	PROMPT	ENTRIES	DISPLAY
RofCLB			
[ ]	△ ALT	[8] [8] [0] [0] [–]	8800
		[6] [3] [4] [4] [=]	2456
ENTER	DIST	[6] [•/:] [7]	6.7
ENTER	G. SPEED†	[9] [7]	97
ENTER	**FT/MIN**	=	593

Your Rate of Climb must be **593** feet per minute to reach a point 6.7 nm away and 2456 feet higher than your take off area.

† A previously calculated speed may be suggested. Write over it with [9] [7]

ENDURANCE

How much Endurance will you have:

Useable Fuel is *48* gallons.
Fuel Flow Rate is *15.8* gallons per hour.

KEY	PROMPT	ENTRIES	DISPLAY
ENDR			
[ ]	AVL FUEL	[4] [8]	48
ENTER	FUEL FLOW	[1] [5] [•/:] [8]	15.8
ENTER	**ENDR**	=	03:02:17

Your Endurance is **3 hours, 2 minutes, and 17 seconds.**

RANGE

How much range do you have:
Ground Speed is *123* knots.
Endurance is *3 hours 2 minutes 17 seconds*

KEY	PROMPT	ENTRIES	DISPLAY
RANGE [ ]	G. SPEED†	[1] [2] [3]	123
[ENTER]	ENDR	[3] [°/:] [°/:] [2] [°/:] [1] [7]	03:02:17
[ENTER]	**RANGE**	=	374

You will have a Range of **374** nautical miles.

DISTANCE TRAVELED

How far have you traveled:

Ground Speed is *108* knots
Elapsed Time is *1 hour 10 minutes*

KEY	PROMPT	ENTRIES	DISPLAY
DIST [ ]	TIME	[1] [°/:] [°/:] [1] [0]	01:10:
[ENTER]	G. SPEED†	[1] [0] [8]	108
[ENTER]	**DIST**	=	126

You have traveled **126** nautical miles.

† Previously calculated speeds may be suggested. Write over this data using the data keys if desired.

GROUND SPEED

What is your Ground Speed between checkpoints:

Distance is *17* nautical miles.
Elapsed Time is *9 minutes 26 seconds.*

KEY	PROMPT	ENTRIES	DISPLAY
SPEED [ ]	DIST	[1] [7]	17
[ENTER]	TIME	[°/:] [°/:] [9] [°/:] [2] [6]	00:09:26
[ENTER]	**SPEED**	=	108.127

Your Ground Speed is **108.127** Knots.

TIME ENROUTE

What will be your Enroute Time from Sante Fe, New Mexico to Winslow, Arizona:

Distance is *231* miles.
Estimated Ground Speed is *123* Knots.

KEY	PROMPT	ENTRIES	DISPLAY
TIME [ ]	DIST	[2] [3] [1]	231
[ENTER]	G. SPEED†	[1] [2] [3]	123
[ENTER]	**TIME**	=	01:52:41

Your Time Enroute is **1 hour 52 minutes 41 seconds.**

† Previously calculated Ground Speeds may be suggested. Write over them with data keys if you desire.

FUEL REQUIREMENTS

How much fuel will you need:

Time Enroute will be *1 hour 52 minutes 40 seconds.*
Fuel Consumption rate is *15.8* gallons per hour.

KEYS	PROMPTS	ENTRIES	DISPLAYS
F. REQ [ ]	TIME	[1] [•/:] [•/:] [5]	
		[2] [•/:] [4] [0]	01:52:40
[ENTER]	FUEL FLOW†	[1] [5] [•/:] [8]	15.8
[ENTER]	**FUEL**	=	29.7

You will need a minimum of **29.7 gallons** of fuel to complete the Enroute Time.

† Previously calculated Fuel Flow may be suggested.

FUEL BURNED

How much fuel have you burned:

Elapsed Time is *2 hours 8 minutes 20 seconds.*
Fuel consumption rate is *17.1* gallons per hour.

KEYS	PROMPTS	ENTRIES	DISPLAYS
F. REQ [ ]	TIME	[2] [•/:] [•/:] [8]	
		[•/:] [2] [0]	02:08:20

[ENTER]	FUEL FLOW†	[1] [7] [•/:] [1]	17.1
[ENTER]	**FUEL**	=	36.6

You have burned **36.6 gallons** of fuel.

† Previously calculated Fuel Flows may be suggested.

FUEL CONSUMPTION RATE

What is your Fuel Consumption rate:

Fuel burned is *20* gallons.
Enroute Time is *1 hour 10 minutes.*

KEY	PROMPT	ENTRIES	DISPLAYS
F. FLOW [ ]	FUEL	[2] [0]	20
[ENTER]	TIME	[1] [•/:] [•/:]	
		[1] [0]	0 1:10:
[ENTER]	**FUEL FLOW**	=	17.1428

Your Fuel Consumption rate is **17.1428** gallons per hour.

WEIGHT AND BALANCE EXAMPLE CALCULATIONS

The following examples show how to:

1. Load a typical aircraft using data for both the "ARM" and "MOMENT" formats.
2. Off-Load Baggage or manage fuel burned.
3. Determine how far to move a known weight to achieve a desired C.G.
4. Determine how much weight to move a known distance to achieve a desired C.G.
5. Convert "C.G." to "MOM/100" format.
6. Convert "MOM/100" to "C.G." format.
7. Determine "%MAC" (Percent Mean Aerodynamic Cord).

If you display the wrong data, you may correct your error prior to pressing the [ENTER] key by pressing the [C/ce] key once. If you have already pressed the [ENTER] key, complete the data set, and then off-load the incorrect data. If you cannot remember the incorrect data entered, you must clear the program by pressing the [C/ce] key twice. You may then restart the program at the beginning or at any point that you know the current Gross Weight and Balance.

GROSS WEIGHT AND C.G.

What is the current Gross Weight and C.G. of the following described aircraft loaded and ready for takeoff:

Item	Weight	ARM	MOM/100
Aircraft Empty Weight	4472	–	6715.1
Oil (24 Qts.)	45	–	141.4
Fuel, Main (100 Gal.)	600	150	–
Fuel, Aux. (28 Gal.)	–	163	–
Crew	310	119	–
Passengers	275	178	–
Baggage, Fwd	–	77	–
Baggage, Aft	230	245	–

KEY	PROMPT	ENTRIES	DISPLAY
WT+MOM			
[ ]	WT	[4] [4] [7] [2]	4472
[ENTER]	MOM/100	[6] [7] [1] [5]	
		[•/:] [1]	6715.1
[ENTER]	WT	[4] [5]	45
[ENTER]	MOM/100	[1] [4] [1] [•/:] [4]	141.4
[ENTER]	WT		0*
WT+CG			
[ ]	WT	[6] [0] [0]	600
[ENTER]	ARM	[1] [5] [0]	150
[ENTER]	WT	[2] [8] [X] [6] [=]	168
[ENTER]	ARM	[1] [6] [3]	163
[ENTER]	WT	[3] [1] [0]	310

ENTER	ARM	1 1 9	119
ENTER	WT	2 7 5	275
ENTER	ARM	1 7 8	178
ENTER	WT	2 3 0	230
ENTER	ARM	2 4 5	245
ENTER	WT		0*
ENTER	**WT**	=	6100*
ENTER	**C.G.**	=	154.954*

Clear problem by pressing c/ce key twice.

* At any time the WT or ***** prompts are on during a Weight and Balance problem, the answer to that point is available by pressing the ENTER key (and entering a zero weight). The ARM C.G. is then available by pressing the ENTER key again. To go back into the Entry Mode, start entering weight data (pressing the Number keys).

† Pressing the WT+CG key while in a WT+MOM Mode or pressing the WT+MOM key while in a WT+CG Mode *changes* the operating Mode and causes a *prompt for Weight.* This Mode change will occur whether the machine is prompting for Weight, ARM, or displaying an answer.

Convert C.G. to MOM/100

c/ce c/ce

WT+CG

□		6 0 0 0	6000
ENTER	ARM	1 5 0	150
ENTER	WT		0*

WT+MOM

□	WT		0*
ENTER	**WT**	=	6000*
ENTER	**MOM/100**	=	9000*

Now remove *100* pounds with a MOM/100 of *90*.

		1 0 0 +/-	- 100

(Prompts start when you start entering data.)

ENTER	MOM/100	9 0 +/-	- 90
ENTER	WT		0*
ENTER	**WT**	=	5900*
ENTER	**MOM/100**	=	8910*

Do not clear the program.

Convert MOM/100 to C.G.

WT+CG

☐	WT		0*
ENTER	**WT**	=	5900*
ENTER	**C.G.**	=	151.016*

The Gross Weight is **5900 pounds** and the C.G. is **151.0 inches** aft of the datum line. **Do not clear the Program.**

Where will the C.G. be if you remove *100 pounds* from baggage station *245:*

	WT	1 0 0 +/-	- 100

(Prompts start when you start entering data.)

ENTER	ARM	2 4 5	245
ENTER	WT		0*
ENTER	**WT**	=	5800*
ENTER	**C.G.**	=	149.396*

The Gross Weight is now **5800 pounds** and the C.G. is **149.4 inches** aft of the datum line. **Do not clear the problem.**

DISTANCE SHIFT

At a Gross Weight of 5800 pounds and C.G. at 149.396 inches, you are aft of the C.G. envelope. How far foreward would you have to move 130 pounds of baggage from station 245 to place your C.G. at 146.5:

WT+CG

↕ SHIFT	? DIST ☐ ⊙CG	1 4 6 ⁒ 5	146.5
ENTER	WT	1 3 0	130
ENTER	**DIST**	=	129.23

You would have to move the baggage foreward **129** inches from station *245* to station *116*. **Do not clear the program.**

WEIGHT SHIFT

Assume that there is no room for baggage at station *116*, but that you do have storage room at station *77*. How much baggage weight would you have to move from station *245* to station *77* to place your C.G. at *146.5*. To recall your position in the program, press the ENTER key twice.

ENTER	**WT**	=	5800*
ENTER	**C.G.**	=	149.396*

WT+MOM

↕ SHIFT	? WT ☐ ⊙CG	1 4 6 ⁒ 5	146.5
ENTER	DIST	2 4 5 - 7 7 =	168
ENTER	**WT**	=	100*

You would have to move **100** pounds of baggage from station 245 to station 77 to achieve the 146.5 C.G. **Do not clear the program.**

%MAC-PERCENT MEAN AERODYNAMIC CORD

(Explorer Only)

With the present C.G. of *149.396*, what is your %MAC on an aircraft with a MAC (Mean Aerodynamic Cord) of *72.6* inches and a LEMAC (Length to Leading Edge of the MAC) of *129.8* inches:

KEY	PROMPT	ENTRIES	DISPLAY
%MAC [↕] [7] SHIFT	LEMAC	[1] [2] [9] [•/:] [8]	129.8
[ENTER]	MAC LENGTH	[7] [2] [•/:] [6]	72.6
[ENTER]	**%MAC**	=	27.*

The %MAC calculated is **27%**.

ESTIMATED GROUND SPEED AND HEADING

What will be your Ground Speed and Heading for a flight from Santa Fe, New Mexico to Winslow, Arizona.

True Airspeed is *140* Knots.
Average Magnetic Course is *247* °
Wind Direction is *320* °
Wind Velocity is *30* knots
Magnetic Variation is *13* ° East

KEYS	PROMPTS	ENTRIES	DISPLAYS
GS+HD [ ]	TRU AIR SPEED	[1] [4] [0]	140
[ENTER]	COURSE	[2] [4] [7]	247
[ENTER]	WIND VEL	[3] [0]	30
[ENTER]	WIND DIR	[3] [2] [0]	
		[–] [1] [3]	
		[=]	307
[ENTER]	**G. SPEED HEADING**	=	123 258

Your Ground Speed will be **123** Knots and your Heading will be **258°**.

UNKNOWN WIND DIRECTION AND VELOCITY

What is the velocity and direction of the wind acting upon the aircraft:

True Airspeed is *140* knots
Ground Speed is *108* knots
Magnetic Course is *245°*
Magnetic Heading is *258°*

KEYS	PROMPTS	ENTRIES	DISPLAYS
WD+WV [ ]	TRU AIR SPEED	[1] [4] [0]	140
[ENTER]	G. SPEED	[1] [0] [8]	108
[ENTER]	COURSE	[2] [4] [5]	245
[ENTER]	HEADING	[2] [5] [8]	258
[ENTER]	**WIND DIR WIND VEL**	=	293 42

The Wind Direction is **293°** and the Wind Velocity is **42** knots.

RHUMB LINE CALCULATION

(Explorer Only)

What is your Rhumb Line Course and Distance from Scholes Airport in Galveston, Texas (Latitude 29° 15' N, Longitude 94° 51' W) to Peoria, Illinois (Latitude 40° 40' N, Longitude 89° 41' W):

TIME FORMAT

KEY	PROMPT	ENTRIES	DISPLAY
RHUM LN [↕] [0] SHIFT	LAT 1	[2] [9] [+/-] [+/-] [1] [5]	29:15:
[ENTER]	LONG 1	[9] [4] [+/-] [+/-] [5] [1]	94:51:
[ENTER]	LAT 2	[4] [0] [+/-] [+/-] [4] [0]	40:40:
[ENTER]	LONG 2	[8] [9] [+/-] [+/-] [4] [1]	89:41:
[ENTER]	**DIST**	=	730.3*
[ENTER]	**COURSE**	=	20

The total distance is **730.3** nautical miles and your course is **20°**.

Note: East Longitudes and South Latitudes must be entered as negatives. Press digit keys followed by change sign key. [+/-] The Explorer will calculate the shortest flight path between two points rather than go around the world to get there. Because of the definition of Rhumb Line Flight, i.e. Constant Course, you cannot fly through, to, or from the poles.

RHUMB LINE CALCULATION

(Explorer Only)

What is your Rhumb Line Course and Distance from Scholes Airport in Galveston, Texas (Latitude 29° 15' N, Longitude 94° 51' W) to Peoria, Illinois (Latitude 40° 40' N, Longitude 89° 41' W):

DECIMAL FORMAT

KEY	PROMPT	ENTRIES	DISPLAY
	RHUM LN		
[↕] [0] SHIFT	LAT 1	[2] [9] [°'"] [°'"] [1] [5]	
		[+] [°'"] [=]	29.25
[ENTER]	LONG 1	[9] [4] [°'"] [°'"] [5] [1]	
		[+] [°'"] [=]	94.85
[ENTER]	LAT 2	[4] [0] [°'"] [°'"] [4] [0]	
		[+] [°'"] [=]	40.6666
[ENTER]	LONG 2	[8] [9] [°'"] [°'"] [4] [1]	
		[+] [°'"] [=]	89.6833
[ENTER]	DIST *		730.3*
[ENTER]	COURSE *		20

The total distance is **730.3** nautical miles and your course is **20°**.

RHUMB LINE CALCULATION

(Explorer Only)

This problem is an example of traveling from one hemisphere to another. What is your Rhumb Line Course and Distance from Honolulu National Airport (Latitude 21.200 N, Longitude 157.555 W) to Sydney, Australia (Latitude 33.564 S, Longitude 151.104 E):

DECIMAL FORMAT

KEY	PROMPT	ENTRIES	DISPLAY
RHUMB LN			
[↕] [0]	LAT 1	[2] [1] [.] [2] [0]	
SHIFT		[0]	21.200
[ENTER]	LONG 1	[1] [5] [7] [.] [5]	
		[5] [5]	157.555
[ENTER]	LAT 2	[3] [3] [.] [5] [6]	
		[4] [+/-]	-33.564
[ENTER]	LONG 2	[1] [5] [1] [.] [1]	
		[0] [4] [+/-]	-151.104
[ENTER]	DIST*		4409.6
[ENTER]	COURSE*		222.

The total distance is **4409.6** nautical miles and your course is **222°**

TIMER AND CLOCK OPERATING INSTRUCTIONS

(Explorer Only)

The Clock (on the [8] key) and Timer (on the [2] key) functions are identical and may be used interchangably. You may use them as two clocks or two timers. To use one as an alarm, set the timer in a count-down mode. The alarm will sound even if the calculator is turned off. To shut off the alarm, turn the calculator on and press the RESET [C/ce] key; alternately, the alarm will turn off by itself in one minute.

The Timer and Clock can be started, stopped, or reset *ONLY* while in the Timer mode **TIMER** prompt is on).

TIMER KEYS

Press the SHIFT [↕] and TIMER [2] or CLOCK [8] keys to access the Timer Mode.

Press the START↑ [+/-] key to start the timer counting up.

Press the START↓ [=] key to start the timer counting down.

Press the STOP [•/:] key to stop the timer.

Press the RESET [C/ce] key to reset the timer and to silence the alarm in the Clock or Computer Mode.

Press the [ENTER] key to enter the computer mode.

To operate timer as an up-count timer, press START↑ [+/-].

To operate the timer as a down-count timer, enter the amount of time you want to elapse before the alarm sounds and then press the START↓ [=] key. When the timer reaches 00:00:00 the alarm will sound, the display will flash, and the timer will start counting up.

To silence the alarm, press the RESET [C/ce] key.

To enter time in Hours, Minutes, and Seconds:

Press the Hour numbers followed by: [•/:] [•/:]

Press the Minutes numbers followed by: [•/:]

Press the Seconds numbers followed by: the START up or down keys.

For example: 3 Hours 21 Minutes 45 Seconds is entered as:

[3] [•/:] [•/:] [2] [1] [•/:] [4] [5]

You may stop and restart the Clock or Timer as often as you wish without resetting either and it will resume counting. Press the COMPUTER ENTER key to return to the Computer Mode. The Timer and Clock will continue to count. If either is counting down, the alarm will sound when 00:00:00 is reached even though the time is not being displayed. Press RESET [C/ce] to silence the alarm. NOTE: Alarm will silence after one minute.

You may return to the Timer Mode at any time while operating a flight program by pressing the SHIFT and TIMER keys. The computer will retain the data entered to that point, and the data prompt will remain on until you return to the computer Mode. If the Time display is flashing when you return to the Timer Mode, it is a reminder that either the Timer or Clock has counted down to 00:00:00 and is now counting up. The time displayed

is how long ago the counter reached 00:00:00. To stop the display flashing, press the RESET c/ce key: the Timer or Clock will continue to count until STOP [÷] is pressed, while you are in that mode.

CLOCK SETTING OPERATION

Set the Clock to *16:43*.

PRESS	PROMPT	ENTRY	DISPLAY
CLOCK [↕] [8] SHIFT	CLOCK	[1] [6] [÷] [÷] [4] [3]	16:43:
START ↑ [+/−]	CLOCK (clock running)		16:43:XX
COMPUTER [ENTER]	(no display change)		16:43:XX

The Navtronic is now back in computer mode and the clock is running; the display is the time at which you re-entered the computer mode.

DISPLAY PRESENT TIME

To display the present time after starting the clock:

PRESS	PROMPT	ENTRY	DISPLAY
CLOCK [↕] [8] SHIFT	CLOCK		03:28:31

Note: Do not press the STOP [÷] key while displaying the time; that will stop the clock at the displayed time (as will removing the battery).

TIMER SETTING OPERATIONS

Set the Timer to provide an alarm in 1 hour 15 minutes:

PRESS	PROMPT	ENTRY	DISPLAY
TIMER [↕] [2] SHIFT	TIMER	[1] [÷] [÷] [1] [5]	01:15:
START ↓ [=]	TIMER (timer running)		01:14:HH
COMPUTER [ENTER]	(no display change)		01:14:HH

The alarm will sound after 1 hour and 15 minutes elapse.

To turn the alarm off, the machine must be turned on. To silence the alarm, press the RESET [c/ce] key. Press STOP [÷] key to stop the count. Then press RESET [c/ce] key to clear out numbers.

RNAV CALCULATIONS

(Explorer Only)

This program enables you to calculate the distance and course between two waypoints addressed by the same VOR. This program uses four prompts:

1 RADIAL: Waypoint 1 Radial from VOR
DIST 1: Waypoint 1 Distance from VOR
2 RADIAL: Waypoint 2 Radial from VOR
DIST 2: Waypoint 2 Distance from VOR

EXAMPLE 1:

If you departed from Santa Fe (Waypoint 1) which is on the 030° Radial and *49* nautical miles from the Albuquerque VOR, and your present position (Waypoint 2) is on the *275°* Radial and *56* nautical miles from the Albuquerque VOR, how far and what course have you flown:

KEY	PROMPT	ENTRIES	DISPLAY
SHIFT ↕ RNAV 1	DIST 2	5 6	56
ENTER	DIST 1	4 9	49
ENTER	1 RADIAL	3 0	30
ENTER	2 RADIAL	2 7 5	275
ENTER	**COURSE DIST**	=	245 89

You have flown on a course of **245°** for a distance of **89** nautical miles.

EXAMPLE 2:

If your present position (Waypoint 1) is on the *84°* Radial and *54* nautical miles from GUP, and your next waypoint △ (2) is on the 190 Radial and 14 naut. miles from GUP, how far and what course do you fly to your next waypoint:

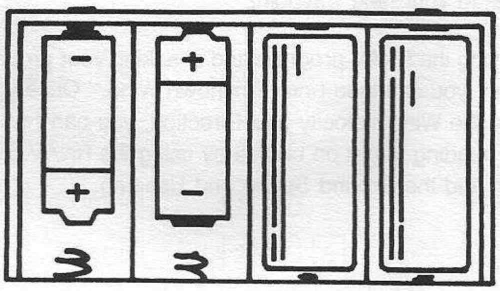
KEY	PROMPT	ENTRIES	DISPLAY
SHIFT ↕ RNAV 1	DIST 2	1 4	14
ENTER	DIST 1	5 4	54
ENTER	1 RADIAL	8 4	84
ENTER	2 RADIAL	1 9 0	190
ENTER	**COURSE DIST**		251 59

You must fly on a course of **251°** for **59** nautical miles to get to your next waypoint.

By using the RNAV program and checking your ground speed, you can then find "Unknown Wind." Once you know the Wind Velocity and Direction, you can find a new heading to get on course by using the RNAV program and the Ground Speed and Heading.

BATTERY REPLACEMENT

Insert small screwdriver in slots provided. Push down and pry up. Batteries are replaced according to diagram inside.



All batteries are marked-plus to plus, minus to minus.

NOTES

LIMITED ONE-YEAR WARRANTY

SPECIALIZED ELECTRONICS CORPORATION (SEC), 9629 IRVING PARK ROAD, SCHILLER PARK, IL 60176, warrants the navtronic FLIGHT COMPUTER for one full year from the date of purchase, against any defect in materials or workmanship not due to owner misuse or neglect or improper handling or shipment by the owner.

Should any such defect occur within the warranty period, SEC will repair or replace the defective FLIGHT COMPUTER, and return it without further cost to you, except for the cost of return postage, provided that the purchaser return the FLIGHT COMPUTER, COMPLETE WITH ALL ACCESSORIES, to SEC, postage prepaid.

THIS WARRANTY SHALL BE THE SOLE EXPRESS WARRANTY MADE BY *SPECIALIZED ELECTRONICS CORPORATION* WITH RESPECT TO THE navtronic FLIGHT COMPUTER.

ALL WARRANTIES IMPLIED BY LAW WITH RESPECT TO THE navtronic FLIGHT COMPUTER, INCLUDING ANY IMPLIED WARRANTY OR MERCHANTABILITY, SHALL BE LIMITED IN DURATION TO THE DURATION OF THIS EXPRESS WARRANTY.

THE REPAIR OR REPLACEMENT REMEDY DESCRIBED HEREIN SHALL BE THE EXCLUSIVE REMEDY FOR BREACH OF WARRANTY WITH RESPECT TO THE navtronic FLIGHT COMPUTER. *SPECIALIZED ELECTRONICS CORPORATION* SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM ANY BREACH OF WARRANTY, EITHER EXPRESSED OR IMPLIED, WITH RESPECT TO THE navtronic FLIGHT COMPUTER.

Note: Some states do not allow limitations on how long an implied warranty lasts or allow the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusion may not apply to you.

This warranty gives you specific legal rights and you may also have other rights which may vary from state to state.

Should you require service on your navtronic pack your computer, aircraft power cord, A.C. charger and carrying case in a secure manner to prevent damage to parts. Return packed unit to:

SPECIALIZED ELECTRONICS CORPORATION
9629 IRVING PARK ROAD
SCHILLER PARK, IL 60176

DO NOT RETURN TO YOUR DEALER.